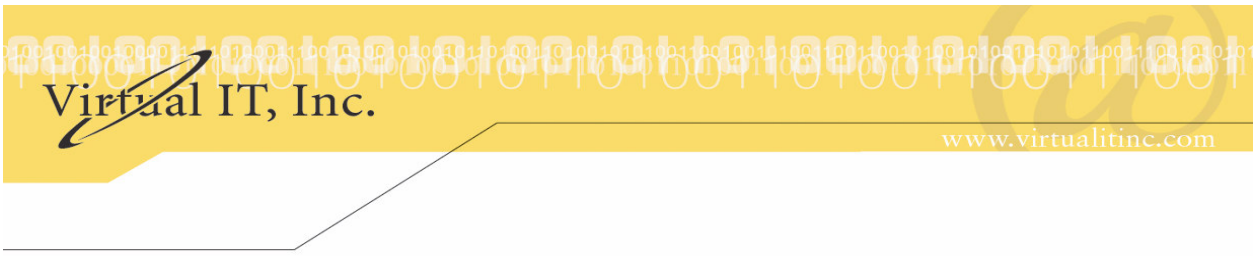

Franklin County
Broadband Assessment

January 20, 2005

Table of Contents

1 EXECUTIVE SUMMARY

Access to high-speed network connectivity is becoming more and more critical to the development of communities both in terms of attracting new commercial and development opportunities and supporting growth with the appropriate technology infrastructure.

There are many broadband service providers serving Franklin County. All of the major types of broadband service are offered at prices competitive with other localities. Coverage across the County is fairly complete with only the Southwest corner and Northwest tip appearing to be underserved.

There is a wide array of options available to serve commercial, government, and residential customers. This study will allow Franklin County to take stock of the existing technology infrastructure and to plan future growth and deployment of major networks.

2 PROJECT OVERVIEW

2.1 PURPOSE

The purpose of this assessment was to document the current state of broadband service across Franklin County. GIS layers have been created for each of the participating broadband service providers. This document should provide a snapshot of the breadth and depth of broadband service in the County, the providers involved, and the prices and service packages available.

2.2 STAKEHOLDERS & DEPARTMENTS

The following stakeholders contributed to and will benefit from the results of this project:

- County Administrator – Rick Huff
- Technology – Sandie Terry
- GIS– Jennifer Martin
- Emergency Services – Bill Agee
- Economic Development – Chris Whitlow
- Broadband Service Providers

2.3 PROCESS

The process Virtual IT undertook to complete this assessment encompassed the following steps:

1. Project Kickoff and Scope Determination
2. Meeting with Franklin County GIS
3. Research
    a. Franklin County Expert
    b. Industry Resources
    c. Service Providers
4. Coverage Analysis
5. Service/Cost Analysis
6. GIS Mapping of Coverage

2.4 DEFINITIONS

The following definitions are used in the discussions of technology in this document:

- Bandwidth
  In this usage Bandwidth is the measurement of internet connectivity. It is measured in Kilobits per Second. Generally, higher bandwidth is more desirable.

- BPL
  Broadband over Power Line (BPL) is a technology that allows Internet data to be transmitted over utility power lines using a modem that plugs into an ordinary wall outlet.

- Broadband
  The term broadband is synonymous with "high-speed internet" generally greater than 200Kb/s.

- Cable Modem
  A cable modem is a device that enables you to hook up your PC to a local cable TV line and receive data at about 1.5 Mbps. It uses the cable company's HFC (Hybrid Fiber-Coaxial) network to access the internet.

- Central Office (CO)
  In telephone communication in the United States, a central office (CO) is an office in a locality to which subscriber home and business lines are connected on what is called a local loop. This is important because DSL technology can service subscribers only within a defined distance of the Central Office.

- Coaxial Cable
  "Coax" is the standard cable used for Cable TV connections.

- Downstream
  The term "downstream" describes the data or bandwidth available for downloading content to the user's computer. This is generally more important than the "upstream" which is mainly used to request the downloaded information.

- DSL
  An acronym for Digital Subscriber Line. A method for moving data over regular phone lines. A DSL circuit is much faster than a regular phone connection, and the wires coming into the subscriber's premises are the same (copper) wires used for regular phone service. A DSL circuit must be configured to connect two specific locations, similar to a leased line (however a DSL circuit is not a leased line).

- Fiber-Optics
  Fiber optic (or "optical fiber") refers to the medium and the technology associated with the transmission of information as light impulses along a glass or plastic wire or fiber. Fiber optic wire carries much more information than conventional copper wire and is far less subject to electromagnetic interference.

- Frame Relay
  Frame Relay is a packet-switching protocol for connecting devices on a Wide Area Network (WAN). Frame Relay networks in the U.S. support data transfer rates at T-1 (1.544 Mbps) and T-3 (45 Mbps) speeds. In fact, you can think of Frame Relay as a way of utilizing existing T-1 and T-3 lines owned by a service provider.

- GIS

A Geographic Information System (GIS) is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data. Spatial data is arranged in "layers" that can be overlaid for mapping and analysis.

- Hybrid Fiber Coax (HFC)
  This type of network is operated by Cable companies and exists of a Fiber Optic network with Coaxial Cable running from nodes to the end user's set top box and/or cable modem.

- OC3
  Optical Carrier 3: an optical fibre line carrying 155mbps; a U.S. designation generally recognized throughout the telecommunications community worldwide.

- Satellite Broadband
  Satellite broadband Internet access uses a satellite channel to carry downlink traffic to the user. A satellite channel is sometimes used also to carry the uplink traffic from large sites. From small sites, a dial-up modem is the most common form of back channel. Typically a very large number of users share each of the satellite channels carrying the broadband service.

- T1
  A digital transmission link with a capacity of 1.544 Mbps.

- Upstream
  The term "upstream" describes the data or bandwidth from the user's computer to the service provider and on to the internet. It usually contains requests for internet pages or data, but can contain files being uploaded from the user's computer.

- WiFi
  Wi-Fi (short for "wireless fidelity") is a term for certain types of wireless local area network (WLAN) that use specifications in the 802.11 family. This wireless connection broadcasts connectivity over a certain radial area around the broadcasting antenna.

- Wireless Point-to-Point (Backhaul)
  Wireless technology is also used for larger capacity backhaul connectivity. This microwave technology transmits data from point-to-point rather than broadcasting over a large area..

2.5 BROADBAND INTERNET TECHNOLOGIES

Many technologies are available for delivering high-speed internet service. Some technologies are suited to various terrain or population densities while others are tied to existing lines of more traditional services. Not all of the technologies described here are currently available in Franklin County. A summary of each technology follows:

2.6 CABLE MODEM

Cable Modem technology utilizes the cable company's network (HFC) to deliver speeds of 1.0 MB/s or higher to customers over the same lines that they deliver cable TV. Because the Hybrid Fiber Coax network employs both fiber-optic and coaxial networks, Cable modem providers are often also fiber-optic service providers.

Because the bandwidth for each node is shared between all of the users attached to the node, the more users concurrently using a node, the less bandwidth that will be available to each user. Speeds can reach over 4-5 Mbps and are generally available over 1.5 Mbps.

Cable modem networks are asymmetric, meaning that the upstream speed is lower than the downstream speed. Cable modem providers can manage or throttle these different speeds as well as managing different tiers of service based on speed and dynamic/static IP addresses. This helps them maximize the returns for each node.

2.7 DSL

Digital Subscriber Line technology provides high-speed internet over standard twisted-pair phone lines. Due to the degradation of speed over line distance, DSL service is limited to subscribers within approximately 3 miles from a Central Office. There are emerging DSL technologies designed to extend this range.

DSL has the ability to throttle both the upstream and downstream speeds of service providing tiered pricing options. DSL can also be configured as Symmetric (upstream and downstream equal) or Asymmetric (upstream slower than downstream).

2.8 WIRELESS BROADBAND

Wireless Internet service is delivered by towers broadcasting and receiving data from stationary, line-of-site antennas at the customers' locations. It is described as point-to-multipoint since one tower provides connectivity for many customers. That tower may be connected to the Internet via a point-to-point wireless backhaul.

Due to the line-of-site requirement, coverage areas are greatly affected by terrain, however this delivery system has become popular in rural areas. The coverage area depends on the location of the tower, the direction of the transponders, and the strength of the broadcast signal. Connection speed is usually around 1.5 Mbps with a slightly slower upstream speed.

2.9 FIBER OPTICS

Fiber Optic cable transmits digital data by encoding lasers and passing light through the tiny glass fibers bundled in the cables. The light patterns need to be similarly decoded at the other end making this process more costly than others. The benefit is that the speeds are very fast and that hundreds of glass strands can be bundled in a very small cable allowing for incredible bandwidth. Because of the cost, fiber has usually been reserved for long-haul applications or for high-use business purposes. However, recently there have been offerings of fiber directly into the home.

Providers describe their fiber offerings by capacity: OC-1, OC-3, OC-12, and OC-192. Some providers offer mainly long-haul or VPN services while others use fiber in conjunction with Coaxial cable networks to provide residential broadband. Digging or hanging fiber is a great expense for providers, so they tend to install much more than is currently needed so they can light it up at a later date.

2.10 SATELLITE BROADBAND

Another broadband connectivity vehicle popular in rural areas is delivered by geosynchronous satellite. Any user with clear southern exposure can get this type of service. A base station dish connected to the Internet backbone broadcasts to the satellite which in turn broadcasts data to all of the subscriber dishes pointed at it.

The upstream is always much smaller than the satellite downstream because either the size of the users dish limits the upstream transmission to 128 kbps or the upstream channel is an actual 56 kbps dial-up connection. Downstream speeds range from 500 kbps for residential service to 1 Mbps for business services. Because of this limited upstream, this delivery method is not suited to applications requiring large uploads.

The subscriber dish is 2-3 feet wide and can be bundled with satellite television service. The signal can be affected by weather or cloud cover.

2.11 BROADBAND OVER POWER LINES (BPL)

While this delivery method is not currently available in Franklin County, it is worth mentioning due to the large footprint that could be affected if internet service was offered over existing power lines. This technology transmits data from a local substation directly to a modem that simply plugs into a wall outlet. Tests are still underway, but speeds have been reported up to 500 kbps.

3 GIS

Franklin County's Geographical Information Systems (GIS) department has compiled the coverage areas for all known broadband service providers serving Franklin County in "layers" in the GIS system. Each provider that has contributed their coverage maps has at least one layer. If a provider is offering different types of service (i.e. DSL and Wireless), the offerings have been represented on separate layers. These layers are available at the Franklin County GIS department and are displayed as flat images with the accompanying provider information in the next section.

4 BROADBAND SERVICE PROVIDERS

This section contains a profile on each of the broadband service providers serving Franklin County. It details their high-level service offerings, technology, and coverage areas. Specific pricing is found in the next section.

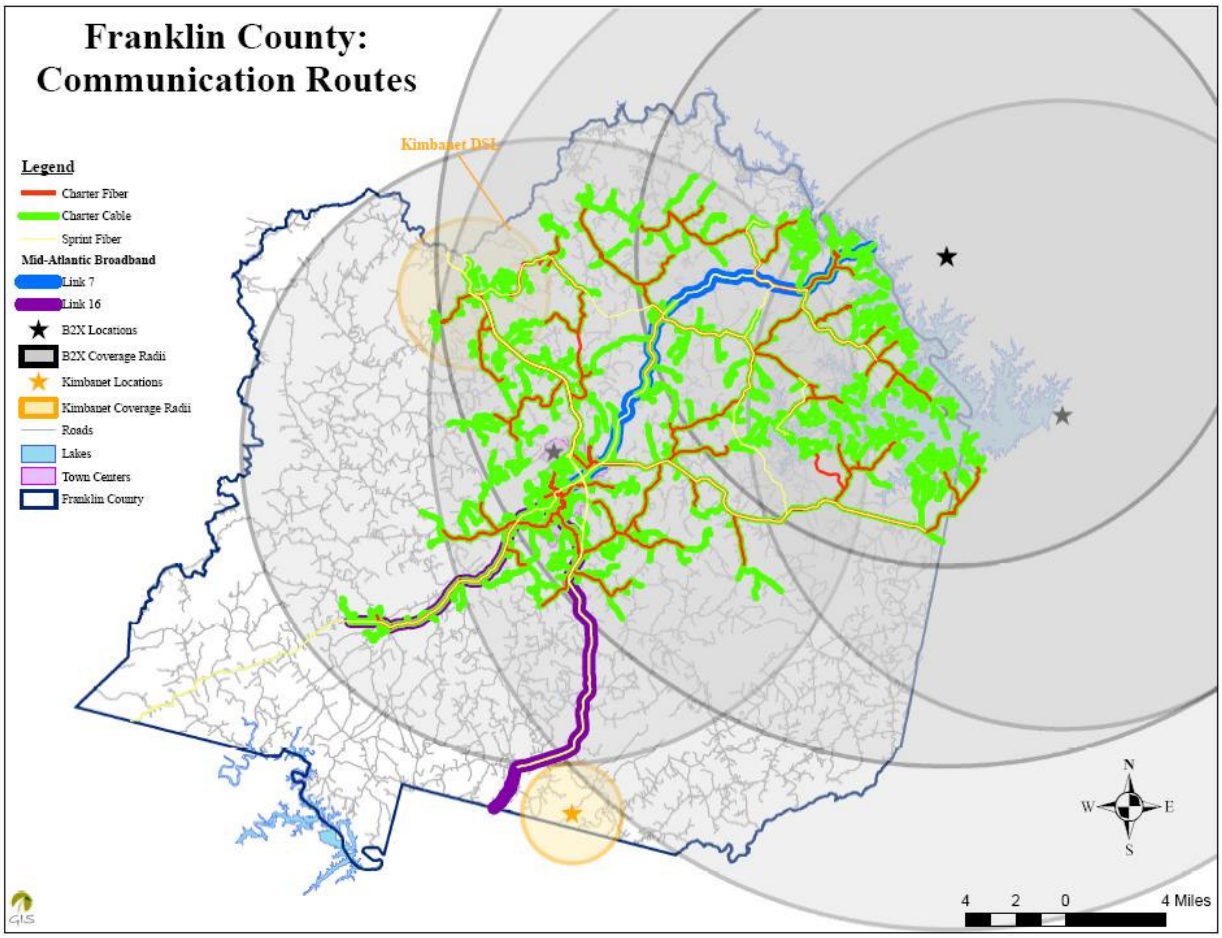

Figure 1 - Composite Broadband Coverage

4.1 B2X ONLINE

B2X Online is a local company based in Salem, Virginia and Martinsville, Virginia owned by Warren and Danny Kane. B2X is a Wireless Internet Service Provider (WISP) with several broadcasting towers serving Franklin County. Because of the varying terrain in Franklin County the coverage areas are limited to line-of-sight access to the towers. B2X uses Wireless Point-to-Point Backhaul to their Network Operating Center in Salem, Virginia.

B2X provides different tiers of service based on throughput (which is the amount of data transferred from one place to another or processed in a specified amount of time). This meters usage giving more bandwidth to their higher paying business customers.

The wireless spectrum that B2X is using is currently largely unregulated. All indications are that this environment will continue into the near future as the government seeks to encourage growth in the wireless broadband industry.

B2X has towers serving Franklin County on:

- Bedford Water Tower
- Bernards Landing

A composite of their coverage in the county is shown below.

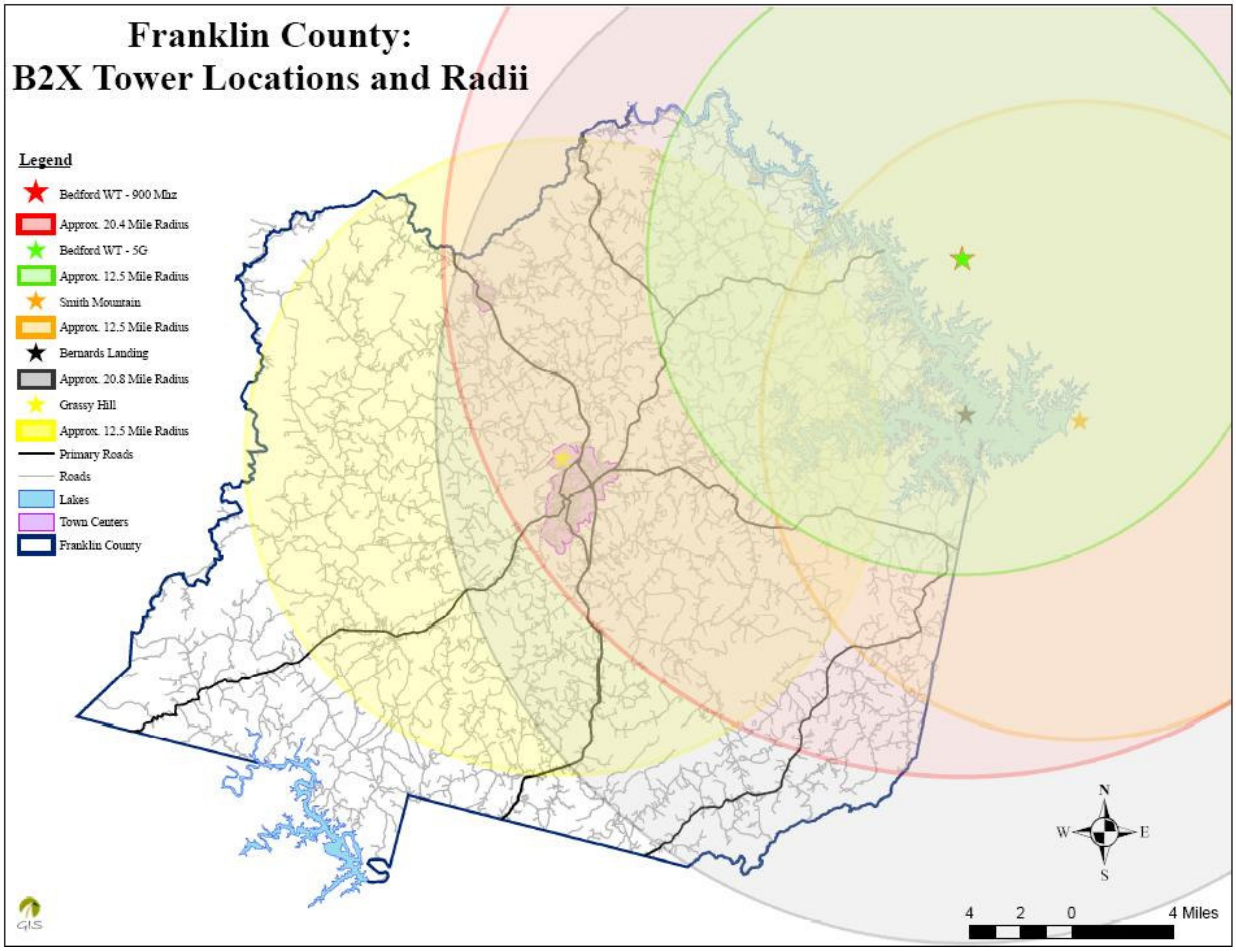

Figure 2 - B2X Composite Coverage Area

4.2 CHARTER COMMUNICATIONS

Charter owns the cable tv and cable modem market in Franklin County. They also have an extensive fiber network that allows them to market fiber connections to businesses. This comprises a traditional Hybrid Fiber Coax network.

The cable is sold as a standard cable package and can be bundled with the high-speed Internet service. The fiber is sold either as a VLAN (Virtual Local Area Network) providing point-to-point connectivity to customers needing large amounts of dedicated bandwidth or as simple Internet connectivity over fiber where it is priced by Megabyte of throughput.

Charter decides where to provide cable service based on the population density measured in customers per mile. Their fiber service can be built out to any reasonable distance from the existing fiber network for a fee.

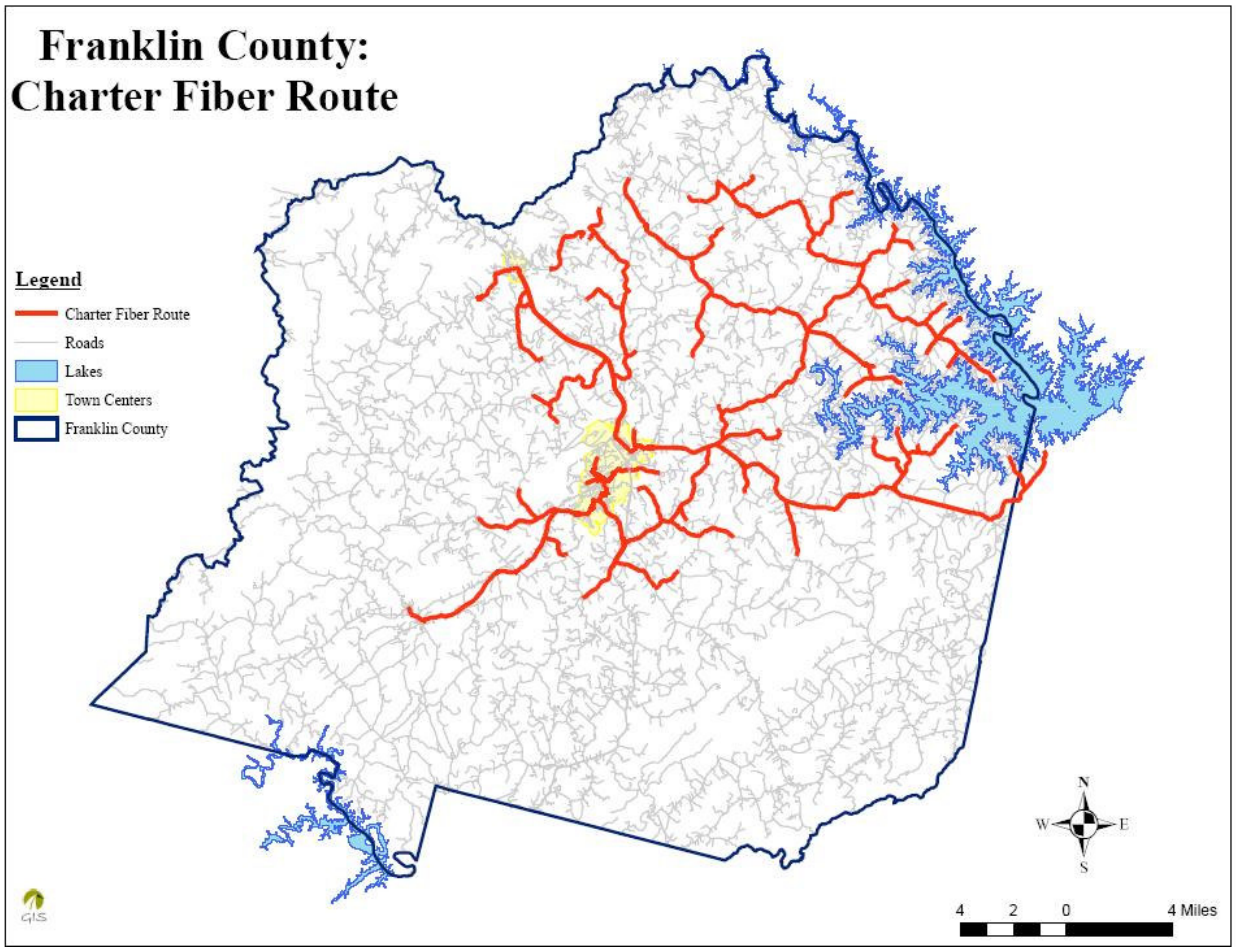

Figure 3 - Charter Fiber Coverage

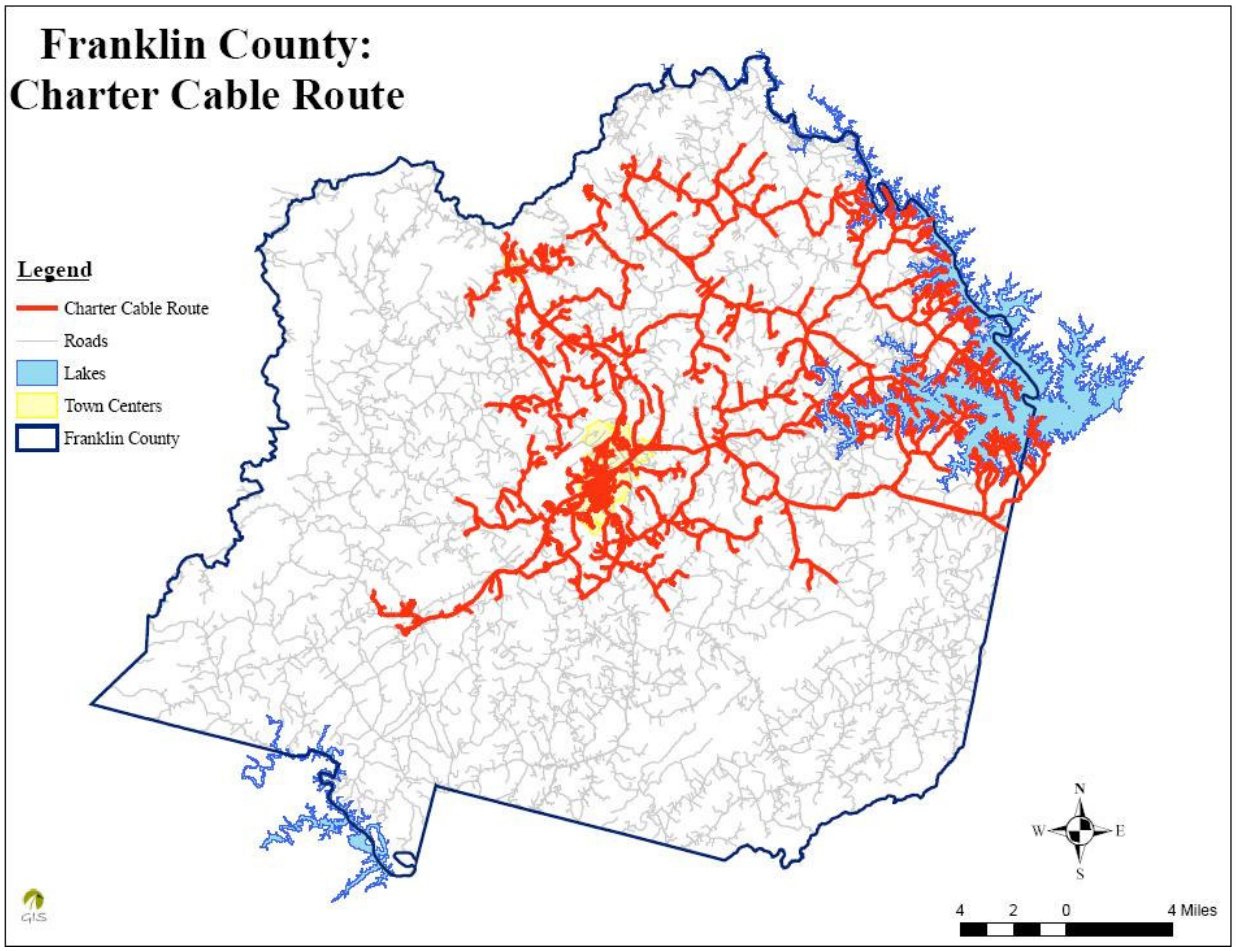

Figure 4 - Charter Cable Coverage

4.3 DIRECWAY

DirecWay, owned by Hughes Network Systems, is the primary provider of satellite broadband services in the country. The nature of satellite broadband means that DirecWay is not specifically focused on Franklin County, but should be available to any subscriber with adequate Southern exposure. DirecWay serves both residential and business customers with a variety of bandwidth and pricing options. Because of the ubiquity of satellite coverage, no coverage map is necessary as anyone with appropriate conditions in the County could benefit from this service.

4.4 KIMBANET

KimbaNet is a local service provider located in Martinsville, Virginia providing a mix of dial-up, DSL, and wireless broadband services to various, isolated areas of Franklin County. KimbaNet is pulling back from some of their wireless service in the County due to lack of subscribership, but offers DSL services in the Boones Mill area and also resells Sprint DSL services in Rocky Mount.

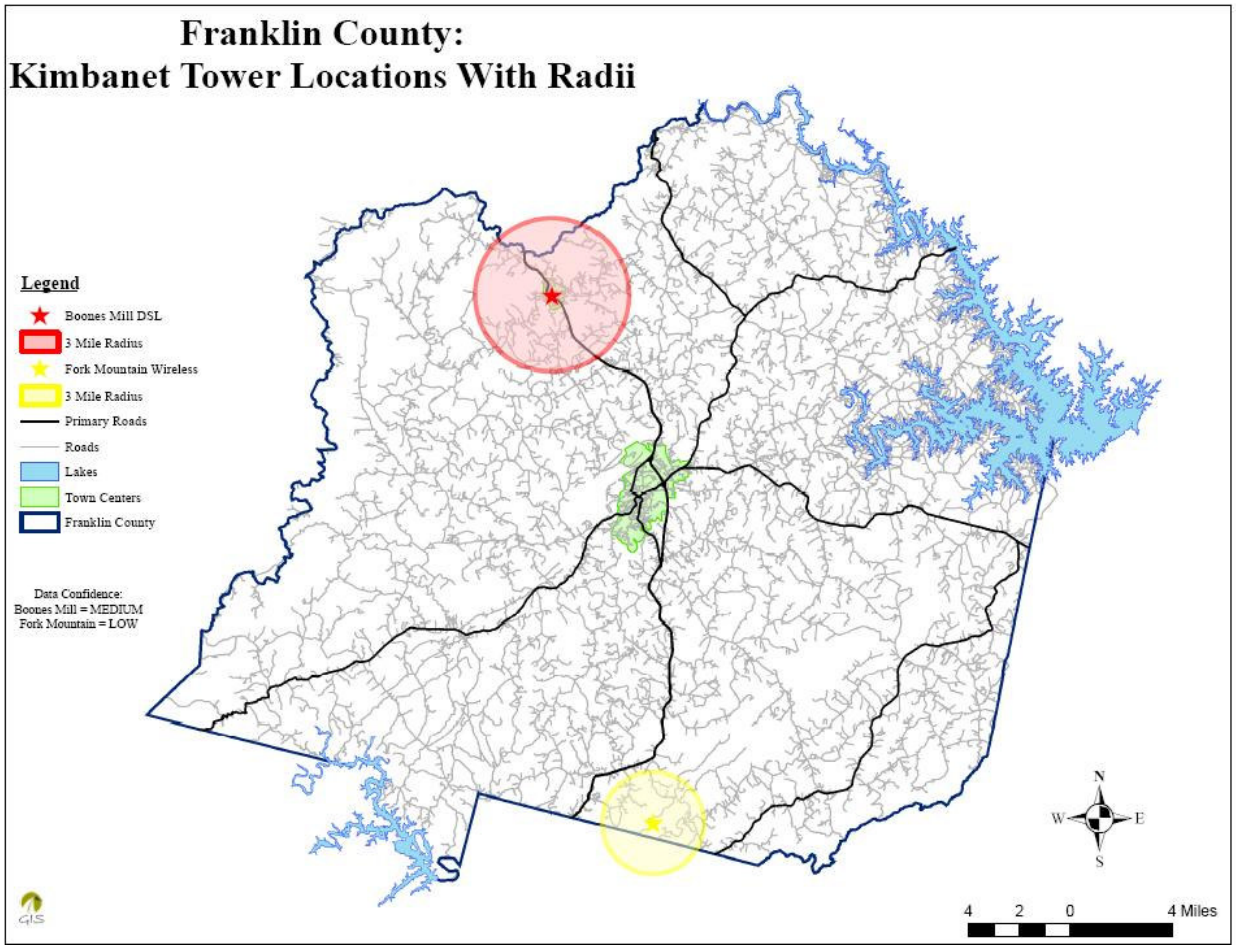

Figure 5 - Kimbanet Coverage

4.5 MID-ATLANTIC BROADBAND COOPERATIVE

The Mid-Atlantic Broadband Cooperative (MBC) is a regional internet backbone initiative providing large capacity, long haul fiber-optic connectivity throughout the Mid-Atlantic region. In Franklin County the route follows Route 220 North from the Southern County border to Rocky Mount where it splits Southwest along Route 40 West to Ferrum College and Northeast along Routes 40 West and 122 West to Smith Mountain Lake and Bedford County.

The lines South of Rocky Mount are being developed by Dewberry & Davis and the lines North of Rocky Mount are being developed by Adesta LLC. The lines are currently in planning and deployment stages. Service should be available within the next year. Most of the lines will be direct buried with conduit going across roads and over bridges. The vendors are installing 48 fibers in the backbone each capable of OC192 throughput and 24 fibers of OC12 in the satellite locations. When this capacity is exhausted, Dense Wavelength Division Multiplexing (DWDM) can be implemented to produce even more bandwidth from these fibers.

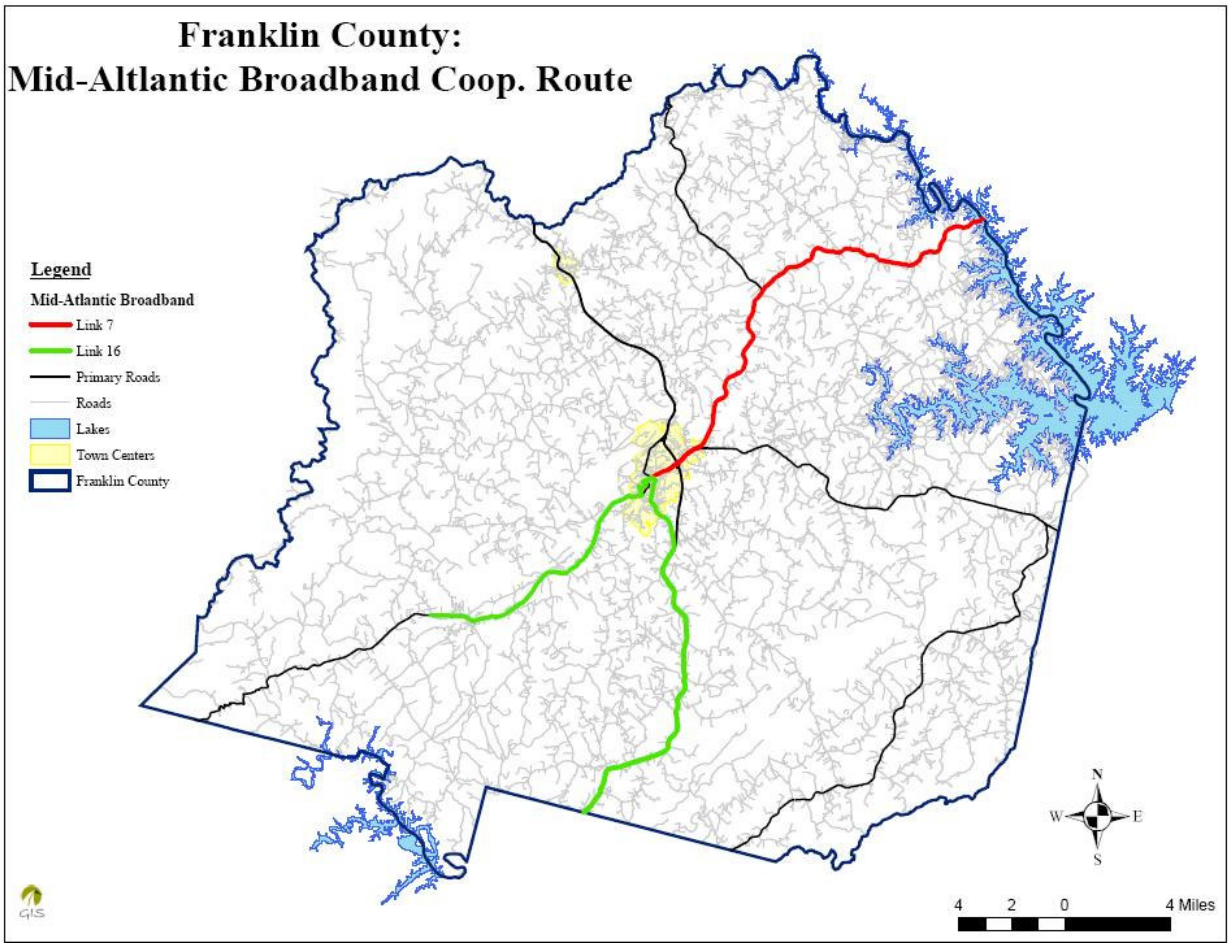

Figure 6 - Planned Mid-Atlantic Broadband Routes

4.6 SPRINT

Sprint offers both fiber-optic connectivity and Asynchronous DSL service in Franklin County. Sprint is a participant in Network Virginia and one of the main providers of fiber in the county. Sprint is also the primary local phone service provider for Franklin County and offers ADSL within 18,000 feet of each of their Central Office locations.

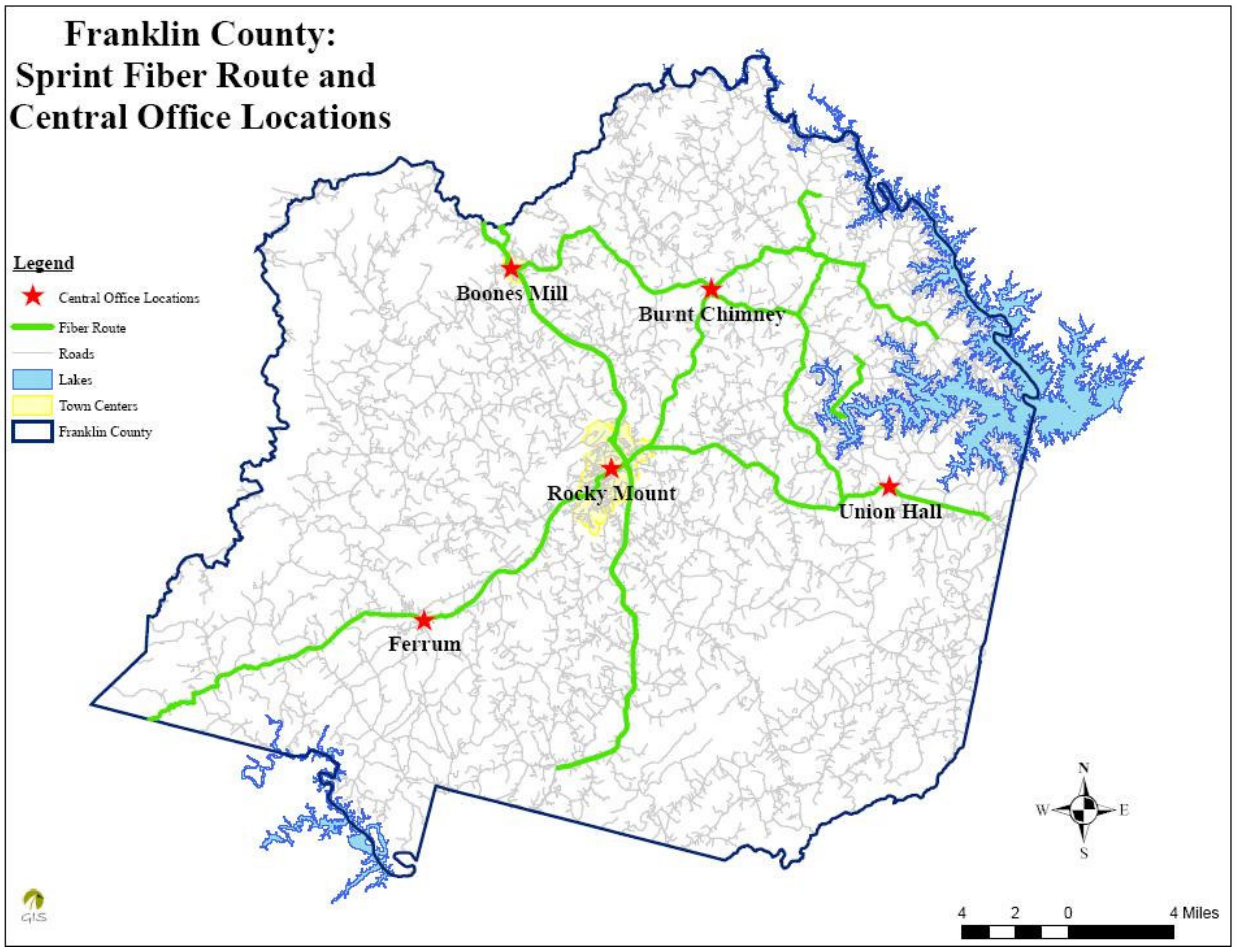

Figure 7 - Sprint Fiber Routes and COs

4.7 STARBAND

StarBand is another satellite broadband service provider very similar to DirecWay. Subscribers need only have a clear Southern exposure to gain access to the DishNetwork.

4.8 VERIZON/NETWORK VIRGINA

Verizon is the prime contractor for Network Virginia services in Franklin County. NetworkVirginia is an advanced, broadband network delivering Internet and intranet services statewide. It is the result of a project led by Virginia Tech in association with Old Dominion University and the Virginia Community College System to develop universal access to competitive, advanced digital communications services for all of Virginia.

Participants in Network Virginia have usually been universities and other K-12 school systems, but the same infrastructure is now open to everyone including commercial customers at low cost.

Network Virginia partners with commercial providers to provide level prices statewide for high-capacity broadband.

Verizon, as the prime contractor, is able to offer connectivity from T1 speeds to OC-192 and beyond. Because the actual wires for this initiative belong to various providers, there is no accompanying coverage map.

4.9 COVANET

COVANET is a contract between MCI and the state of Virginia to provide high-speed internet services such as Frame Relay and ATM to local governments. The services are only available to local governments and do not cover any commercial applications. MCI's UUNET physical plant does not extend into Franklin County, but through partnerships they are able to offer services to local governments in the County.

4.10 NTELOS

Ntelos has fiber running through Franklin County, but doesn't have any "breaks" or service points in the County. The company would be willing to break the fiber in Franklin County for the right opportunity, but currently offers no broadband services.

5 BROADBAND SERVICE PROVIDER CONTACT INFORMATION

Company	Contact Name	Phone	Email	Service Type	Web Address
B2X Online	Warren Kane	540-389-7924	Warren.Kane@b2xonline.com	Wireless	http://www.b2xonline.com
Charter Communications	Kirk Averett	540-605-0749	kaverett@chartercom.com	Fiber Cable Modem	http://www.chartercom.com
COVANET/MCI	Carroll Mitchell	804-527-6325	Carroll.Mitchell@mci.com	Fiber	http://www.covanet.state.va.us
DirecWay	Customer Service	866-556-9962		Satellite	http://www.direcway.com
KimbaNet	John Wolchko	276-666-9209	john@kimbanet.com	Wireless DSL	http://www.kimbanet.com
Mid-Atlantic Broadband Coop.	Adesta: Don Leber D&D:Joe Stanley	434-455-2009 434-797-4497	dleber@adestagroup.com	Fiber	http://www.mbc.coop/ http://www.mbc-rbi.org/ http://www.adestagroup.com http://www.dewberry.com
Ntelos	Dan Overstreet	540-591-5446	doverstreet@ntelos.com	Fiber	http://www.ntelos.com
Sprint	Steve Rucker	276-666-4227	Steve_Rucker@mail.sprint.com	Fiber DSL	http://www.sprint.com
Starband	Dealer	800-4STARBAND		Satellite	http://www.starband.com
Verizon	James Funkhauser	540-465-4951		Fiber Copper	http://www.verizon.com
Network Virginia	Mark Roberts	804-772-1473	Mark.w.Roberts@verizon.com	Fiber	http://www.networkvirginia.com

6 BROADBAND SERVICE PRICING

Provider	Service Type	Plan	Installation/ Activation	Monthly Fee	Downstream	Upstream	Comments/Other
B2X Online	Wireless	Business – 4	$350.00	$400.00	1 Mbps	1 Mbps	5 emails / static IP Unlimited throughput
[redacted]		Business – 3	$350.00	$200.00	1 Mbps	1 Mbps	5 emails / static IP 250 GB throughput
		Business – 2	$300.00	$150.00	1 Mbps	1 Mbps	5 emails / static IP 125 GB throughput
		Business – 1	$250.00	$100.00	1 Mbps	1 Mbps	5 emails / static IP 50 GB throughput
		Business – A	$150.00	$60.00	1 Mbps	1 Mbps	5 emails / static IP 25 GB throughput
		Residential – 2	$85.00	$60.00	1 Mbps	1 Mbps	1 email/dynamic IP 25 GB throughput
		Residential – 1	$85.00	$40.00	1 Mbps	1 Mbps	1 email/dynamic IP Rate for 2 yr contract 25 GB throughput
Charter Communications	Cable Modem	Residential		$29.99	384 Kbps	128 Kbps	10 emails / dynamic IP
[redacted]		Residential		$39.99	3 Mbps	256 Kbps	10 emails / dynamic IP
		Business	$150.00	$59.99	512 Kbps	128 Kbps	3 emails / static IP
		Business	$150.00	$89.99	1.5 Mbps	256 Kbps	3 emails / static IP
		Business	$150.00	$129.99	3 Mbps	384 Kbps	3 emails / static IP
		Business	$150.00	$229.99	3 Mbps	1 Mbps	3 emails / static IP
	Fiber	VLAN (Point-to-Point)	Negotiated	Negotiated	To Order	To Order	
		Internet LAN	Negotiated	~$500/MB			Measured in Throughput
DirecWay	Satellite	Home/Up Front	$599.98	$59.99	500 Kbps	50 Kbps	5 emails / dynamic IP / buy equipment
[redacted]		Home/Promo	$99.99	$99.99	500 Kbps	50 Kbps	5 emails / dynamic IP / rent equipment / activation

Provider	Service Type	Plan	Installation/ Activation	Monthly Fee	Downstream	Upstream	Comments/Other
		Business/Up Front	$599.98	$89.99	500 Kbps	50 Kbps	5 emails / static IP / buy equipment
		Business/Promo	$99.99	$129.99	500 Kbps	50 Kbps	5 emails / static IP / rent equipment
		Small Office	$999.98	$99.99	1 Mps	100 Kbps	5 emails / static IP / buy equipment
		Business Internet	$999.98	$129.99	1 Mps	100 Kbps	10 emails / static IP / buy equipment
KimbaNet	Wireless	Residential	$100.00*	$74.95	512 kbps	512 kbps	3 emails / dynamic IP/ *with 2yr contract
		Business	$300.00**	$150.00	1 Mbps+	1 Mbps+	10 emails / static IP / **with 1yr contract
	ADSL	Residential	Free**	$49.95	512 Kbps	128 Kbps	5 emails / dynamic IP / **with 1yr contract
		Residential	Free**	$64.99	1.5 Mbps	384 Kbps	5 emails / dynamic IP / **with 1yr contract
		Business	Free**	$49.99	512 Kbps	128 Kbps	5 emails / dynamic IP / **with 1yr contract
		Business	Free**	$99.99	1.5 Mbps	384 Kbps	10 emails / dynamic IP / **with 1yr contract
	SDSL	Residential	$100/$300/$500*	$74.95	512 Kbps	512 Kbps	5 emails / dynamic IP / *with 2yr/1yr/no contract
		Business	$100/$300/$500*	$150.00	960 Kbps	960 Kbps	10 emails / static IP / *with 2yr/1yr/no contract
		Business	Free**	$164.99	640 Kbps	640 Kbps	10 emails / dynamic IP / **with 1yr contract
Mid-Atlantic Broadband Coop	Fiber	General	Negotiated	Negotiated	Negotiated	Negotiated	
Sprint	ADSL	Residential	$49.99*	$24.99	512 Kbps	128 Kbps	*Rebate for activation
		Residential	$49.99*	$39.99	1.5 Mbps	384 Kbps	*Rebate for activation
		Residential	$49.99*	$79.99	3.0 Mbps	512 Kbps	*Rebate for activation
		Small Business	$150.00*	$34.99	512 Kbps	128 Kbps	*Free w/ 2yr contract *$49.99 w/ 1yr contract
		Small Buisness	$150.00*	$74.99	1.5 Mbps	384 Kbps	*Free w/ 2yr contract

Provider	Service Type	Plan	Installation/ Activation	Monthly Fee	Downstream	Upstream	Comments/Other
							*$49.99 w/ 1yr contract
		Small Buisness	$150.00*	$149.99	3.0 Mbps	512 Kbps	*Free w/ 2yr contract *$49.99 w/ 1yr contract
		Complex Business	$150.00*	$39.99	512 Kbps	128 Kbps	*Free w/ 2yr contract *$49.99 w/ 1yr contract
		Complex Business	$150.00*	$79.99	1.5 Mbps	384 Kbps	*Free w/ 2yr contract *$49.99 w/ 1yr contract
		Complex Business	$150.00*	$159.99	3.0 Mbps	512 Kbps	*Free w/ 2yr contract *$49.99 w/ 1yr contract
Verizon/NetworkVA	Fiber	DS1 (T1) – Govt	$500.00	$860.00	1.5 Mbps	1.5 Mbps	
		DS3 – Govt	$1,000.00	$4,427.00	45 Mbps	45 Mbps	
		OC3 – Govt	$2,000.00	$11,143.00	155 Mbps	155 Mbps	
		DS1 (T1) – Comm.	$500.00	$1,175.00	1.5 Mbps	1.5 Mbps	
		DS3 – Comm.	$1,000.00	$5,228.00	45 Mbps	45 Mbps	
		OC3 – Comm.	$2,000.00	$12,467.00	155 Mbps	155 Mbps	